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Research Notes : The effects of temperature on longevity and vitality of soybean seeds

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1) The effects of temperature on longevity and vitality of soybean seeds

Studies involving longevity and vitality of seeds after subjection to certain environmental conditions are both numerous and include many species of seeds. When stored under laboratory room conditions, year-to-year plantings are required to maintain adequate quantities of viable soybean seeds for the basic genetics laboratories. Begun in 1971, this study was undertaken for the purpose of investigating the role of temperature in maintaining high germination percentages in seeds subjected to an extended period of storage.

The seeds comprising the lot from which the individual samples were drawn were the progeny of self-pollinated plants whose leaf phenotype was "light" green in color. Produced on the writer's test plot, harvesting of the seeds was delayed until all of the leaves had fallen from the plants and the pods were uniformly dark brown to black in color. Harvested in October, the pods were further air dried by placing a thin layer on a well-ventilated shelf and observing them frequently for one month. The lot was next divided into three samples of approximately 1,000 seeds each. Identified as samples A, B, and C, respectively, each sample was prepared and stored under the following conditions:

Sample	Storage conditions*
A	Laboratory room temperature
B	Household refrigerator
C	Laboratory freezer

*All samples were placed in plastic containers prior to storage.

Once each year, 50 seeds were drawn from each of the designated samples and tested for longevity and vitality. Testing was accomplished by placing 8 cm of sterilized potting medium (1 part garden soil, 1 part coarse builder's sand, and 1 part vermiculite) into a standard greenhouse propagation flat (35 cm wide, 52 cm long, and 10 cm high). The medium was next firmed, the 50 seeds were spaced uniformly over the surface, and covered with about 2 cm of potting medium. The surface was next firmed, the medium was sprayed until wet throughout, and the flats were placed on greenhouse benches and observed daily for the duration of the testing period. Testing for longevity and vitality was terminated on the 14th day after the seeds were planted.

As may be observed from Figure 1, there is significant fluctuation in germination percentages when individual samples are compared. Seeds stored in the freezer (Sample C) showed 95% germination following a period of ten years in storage. The drastic drop in germination percentage from 82% in 1974 to 58% in 1975 cannot be readily explained. A contributing factor to the low percentage of germination could be the time of the year in which testing was conducted. Records show that this particular sample was tested in late February, while the remaining tests were conducted between late April and early July of each year. While showing less year-to-year fluctuation in germination percentage than Sample C, seeds in Sample B showed 87% longevity following a 10-year period in storage. It should be noted that Sample A

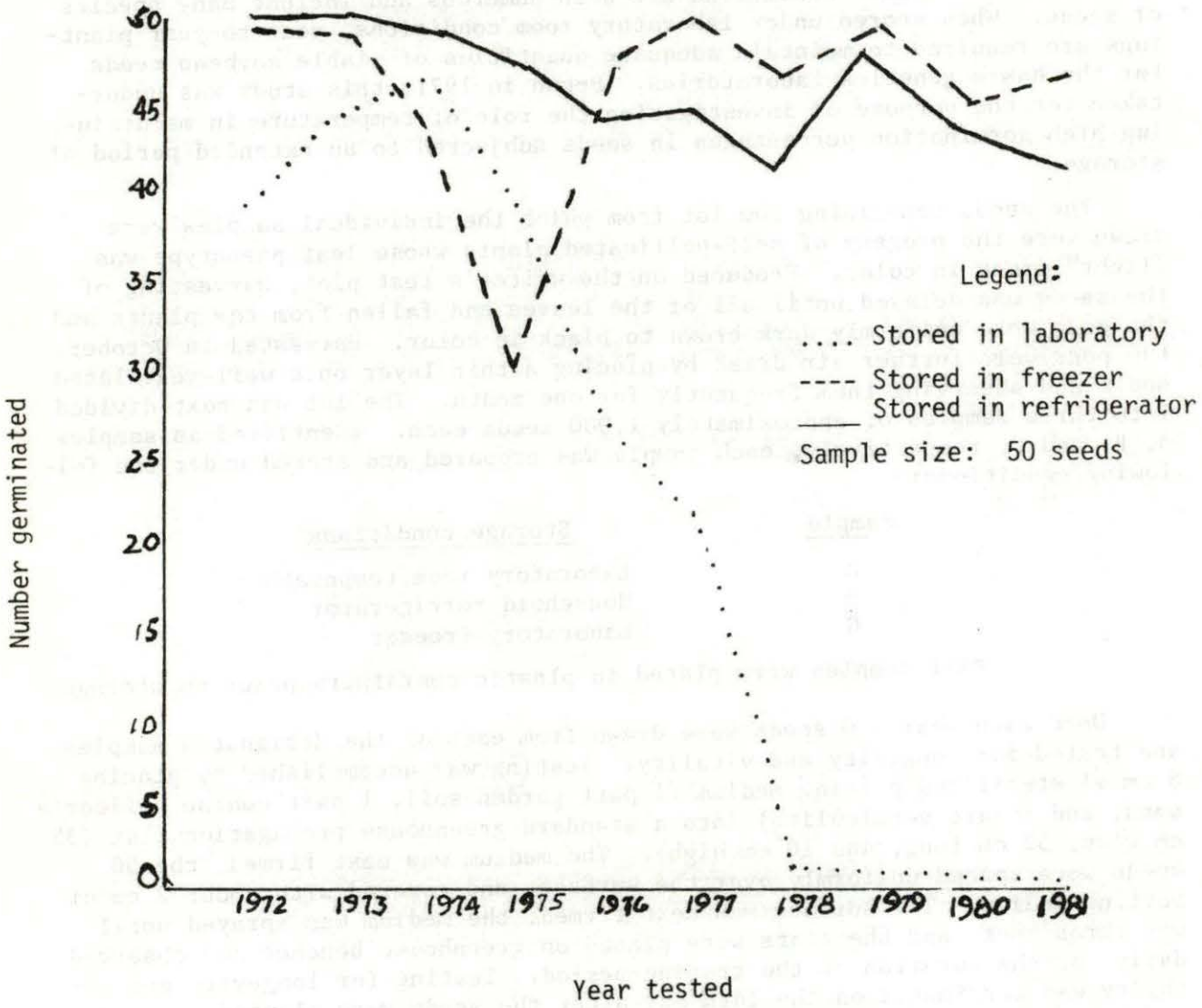

Figure 1. The effects of temperature on longevity and vitality of soybean seeds.

showed an increase in germination percentage for the years 1972 through 1974. Subsequent testings of Sample A, however, showed a consistent decrease each year until 1980 when the germination percentage reached zero. Since there was zero germination in Sample A again in 1981, a two-year period of zero germination convinced the writer to terminate the investigation. It should be noted that longevity tests of seeds in samples B and C will be continued beyond the 10-year storage period.

Based upon the results of this study, it seems reasonable to conclude that longevity is increased when soybean seeds are maintained under uniformly lower temperature conditions than those that prevail in the laboratory.

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